

## Experiences with Caudal Analgesia in a Small Community Hospital

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### SUMMARY

*Experience with caudal analgesia for obstetrical patients in a small community hospital, using a technique adapted to the limitations of facilities and personnel, has led to the belief that requirements for the procedure can be met in any good, well-run small hospital.*

ANALGESIA and anesthesia in childbirth has been a major problem besetting the obstetricians of the world since the beginning of history. At present it is perhaps the most controversial phase in the field of obstetrics. Prior to the middle of the 19th century but meager efforts had been made to alleviate the pains of childbirth. In 1847 ether and chloroform were introduced in obstetrics. The acceptance of chloroform by Queen Victoria sanctioned the use of anesthesia in childbirth for the general public and this resulted in a great impetus to this entire field of medicine. In 1880 nitrous oxide-oxygen was introduced by Klikowitsch in Petrograd. This was soon followed by the addition of scopolamine and morphine. The use of barbiturates was begun in 1923. During this same period Gwathmey devised the technique of rectal instillation of ether. Tribromethanol (Avertin®) was popular for a short period, and later paraldehyde was used, both rectally and by mouth. The employment of caudal block began early in the century, but even though this technique was used in many cases it fell into disuse for several reasons. In 1940 Hingson and Edwards reestablished the caudal block as a useful procedure in obstetrics and it is largely through their efforts that this technique has become popularized in the past decade.

Spinal anesthesia, which has been employed over a period of years for obviation of pain in obstetrics, recently has come to be used more widely. The Dick Grantly Read method of psychotherapy and relaxation is also being employed in increasing numbers of cases. This approach to labor is one that has much to offer in the handling of any obstetrical case regardless of the type of anesthesia employed. The search for the perfect technique is still in progress and with each new advance an addition is made to the medical armamentarium in the battle with the pain of childbirth.

Until recently the use of anesthesia in labor has been directed at relieving the mother of pain, with the infant receiving secondary consideration. Obviously in most methods for relieving pain the unborn infant is to a greater or less extent involved in the effects of agents used. Snyder in a recent monograph "Obstetric Analgesia and Anesthesia" has reevaluated this aspect of the problem so that more and more obstetricians are giving increased consideration to the second patient, the infant, in employing anesthesia and analgesia in labor. The criteria of relief of pain combined with complete safety for both mother and unborn infant are ever before us and it is probably true that no one procedure will ever be found that will fulfill all these demands in all cases. It is therefore necessary to evaluate the many factors in each case, in each situation, and select the most advantageous technique for use.

The particular background and environment in which the author confronts the problems outlined differ from the situations to which most trained obstetricians are accustomed. Ten years ago the community in which he practiced was made up of approximately 25,000 people living in the towns of the Monterey Peninsula and the immediately surrounding areas. Hospital facilities for this population were provided by two general hospitals with an effective bed capacity of about 60, in addition to two small nursing-home hospitals which provided an additional ten to fifteen beds. Aside from an occasional home delivery all patients during this period were delivered in these hospitals or at the County Hospital in Salinas. The number of babies born on the Monterey Peninsula in 1938, 1939 and 1940 were 306, 317 and 442, respectively. One hospital (where the fewest infants were delivered) had a resident nurse-anesthetist during the pre-war years who was available to administer general anesthesia for delivery. The other hospitals had no trained personnel for anesthesia and it was the custom for the nurse in charge of the patients in labor to give drop ether for delivery. Occasionally one of the local general practitioners was called in to administer nitrous oxide-oxygen or ether, and in a few cases local anesthesia was employed. During the war years when the number of deliveries increased considerably and the number of physicians decreased, it was nearly impossible to have a physician anesthetist for uncomplicated cases.

Since the end of the war the population of the Monterey Peninsula has reached an estimated 60,000. The numbers of births for the years 1945

to 1949 were 1,035, 974, 1,142, 1,341, and 1,612 respectively. The number of available private hospital beds has increased to 90, and in addition there is an obstetrical service at the Fort Ord Station Hospital which provides hospitalization for wives of armed service personnel. During this period there has developed a group of physician anesthetists. Three of the group are general practitioners who have had more or less specialized training in anesthesia, and there is one whose practice is limited to anesthesia. One or more of these physicians is usually available for the administration of anesthesia to obstetrical patients.

It is well known that the average obstetrical patient is a poor subject for general anesthesia. The patient frequently arrives at the hospital after a full meal and often is emotionally upset and apprehensive. The nasal passages may be congested from crying during labor, and at best the anesthetist regards the obstetrical patient with misgivings. That there have been only rare serious anesthetic accidents in the author's experience is more good fortune than a result of ideal working conditions.

The use during labor of analgesics such as barbiturates, scopolamine, and Demerol,<sup>®</sup> in addition to general anesthesia for delivery, increases the incidence of anoxia and asphyxia in the newborn. In the author's experience there have been only a few cases in which such effect on the infants has been pronounced, possibly because an attempt has been made to use medication in moderation. Nonetheless, it is easy to see that conditions for mother, infant, obstetrician and nurse were far from ideal.

With this background in mind, it was decided to establish the use of caudal analgesia and anesthesia as a technique in the care of selected patients for labor and delivery in an effort to avoid some of the previously mentioned problems.

Several features of caudal analgesia seemed attractive. Primarily, it avoided general anesthesia which has always seemed particularly hazardous in obstetrics, both for mother and infant. It offered a maximum of pain relief to the patient in labor with a minimum of effect on the infant. The chief problem seemed to relate to the modification of the technique as used in large institutions to make it practicable in a small hospital. There were several factors in the local situation which were not commonly present in institutions from which success with the use of caudal analgesia had been reported. By the time the use of caudal analgesia and anesthesia was decided upon, all hospital care was limited to the two general hospitals, but these are small and have only partially organized obstetrical departments. There are no residents or interns, and the nursing staff, while adequate, is somewhat limited as would be expected in a hospital where no more than ten to twelve beds are allotted to obstetrical patients. In addition the delivery rooms are adjacent to the surgery suite rather than being an integral part of the obstetrical wing.

The problem, then, was one of planning the procedure in such a way that after the anesthetic was

administered and established, the patient could be safely and easily supervised by a registered nurse.

After consultation with members of the department of anesthesia at Stanford University School of Medicine, a procedure with pontocaine solution as a single injection block was adopted. Epinephrine was added to a 0.15 per cent solution of pontocaine to prolong the relatively long action of the drug. The intermittent or single injection technique was followed rather than the continuous method because of the minimum amount of medical and nursing supervision required in the former procedure. Trials were made with inlying malleable caudal needles and the catheter technique, but as it was found this increased the problems of the supervising nurse with the only advantage gained being the avoidance of reinsertion of the needle for repeated injections, these techniques were abandoned. Not infrequently the malleable needle became dislodged and reinsertion of the needle for reblock was required anyway. It was also found that it is easier technically to insert a non-malleable spinal needle than the malleable caudal needle and that as experience increased skill improved and the problem of reinsertion of the needle for reblock became minimal. The patients themselves were happier and less apprehensive when the needle was removed at the end of each injection. The only accident encountered with a needle resulted from moving a patient with an inlying malleable caudal needle, which broke below the hub. It was retrieved without difficulty, but the experience emphasized that the presence of such a needle does bring special problems and does require more care and supervision of the patient than the other procedure.

It is routine to use one of the barbiturates prior to the pontocaine injection. Usually 0.1 gm. to 0.2 gm. of Nembutal<sup>®</sup> along with 0.065 gm. of codeine or 50 mg. of Demerol<sup>®</sup> is given fairly early in the first stage and this usually provides adequate sedation to carry the patient to the time when the caudal anesthetic is administered. In cases in which the cervix dilates slowly it is sometimes necessary to give some additional sedation before the anesthetic is given. The patient is placed in a modified Sims's position, the area is prepared with tincture of merthiolate, and a 20-gauge 2½- or 3-inch spinal needle is inserted into the caudal canal. Test aspiration is done to make sure that the subarachnoid space has not been punctured, and a 6 to 8 cc. test dose of 0.15 per cent solution of pontocaine is injected. After a wait of ten minutes the patient is observed for signs or symptoms of subarachnoid injection. None being found, the effective dose of anesthetic solution, usually 25 cc., is injected. When caudal anesthesia was first employed, the total dose was varied according to the height of the patient, but undesirably high levels of anesthesia were obtained in some cases, and it was found that there was generally little correlation between the patient's height and the anesthetic effectiveness of a standard dose. With a 25 cc. injection the incidence of high levels of anesthesia, and attendant complications, has been

cut to nil and the number of times that this amount of anesthetic mixture is insufficient for adequate analgesia is low. Following the injection the patient is returned to her back, the head is elevated slightly and a pillow is placed under the knees. The blood pressure and pulse are observed at frequent intervals. A decrease in blood pressure of 10 to 20 mm. of mercury is not unusual. If the systolic blood pressure falls to 100 mm. of mercury, a circulatory stimulant is administered. A pronounced decrease in blood pressure can lead to an anoxic state in the infant. A systolic blood pressure of 80 mm. is considered essential to provide adequate oxygen supply to the infant. Ephedrine or Neosynephrine® is usually employed for stimulation, and use of these drugs is repeated if indicated. Rarely are there signs of oxygen want, but when this exists, oxygen inhalations are given. The regularity and duration of uterine contractions are carefully observed.

It is the rule that the attending physician remain with the patient for a minimum of 45 minutes following the caudal injection. If, as is usual, at the end of this time the anesthetic level is established, the blood pressure is stabilized and the condition of the patient is satisfactory, the physician may leave the continued care and observation of the patient to the nurse in charge of patients in labor. If a return of pain is noted by the patient, a reblock may be carried out in the manner previously described.

When this method was first employed, patients were selected according to the usual indications and contraindications listed in the literature. It is no doubt true that, in initial enthusiasm for the method, the procedure was employed in some cases in which another method might have been better. That the method is only being used now in about 50 per cent of the cases, whereas during the first year it was employed in about 73 per cent of the cases, is not so much a reflection on the value of the technique as it is evidence of the realization of the great importance of careful selection of patients. Three years ago, where no contraindication existed, caudal analgesia was employed in patients in active labor with the cervix dilated to about 4 cm. Now the anesthetic agent is not introduced until dilation has reached 5 to 6 cm. This is done because, contrary to the reports in the literature, it is felt that there is a definite tendency for the progress of labor to slacken when analgesia is established early (4 cm. dilation or less). As a result of this postponement of the administration of the caudal block, there are a number of cases, especially in multiparae, in which progress is so rapid from the 5 to 6 cm. dilation stage to complete dilation that there is insufficient time to use the caudal technique. This is one of the factors in lowering the percentage of cases in which caudal analgesia is used. The author has become wary of this procedure for women in whom there is any sign of uterine inertia; and if caudal anesthesia is used at all in such circumstances, it is deferred until the end of the first stage of labor or the beginning of the second.

Patients who have no deep-seated apprehension with regard to it have been encouraged to permit the use of caudal analgesia, but it has not been urged upon anyone who was definitely opposed to it, save possibly in the case of premature labor in which the avoidance of general anesthesia is such a definite advantage to the premature infant.

Breech presentation is considered by some physicians to be a contraindication to the use of caudal analgesia; the increased tonicity of the uterine musculature is thought to increase the difficulty of breech delivery. However, the author in using this procedure in breech presentations has noted that the relaxation of the pelvic floor seems to make delivery easier.

At first caudal anesthesia was used in cesarean section, but the time consumed in establishing the anesthetic level and the relatively high percentage of cases in which anesthesia was inadequate was found to be a distinct disadvantage in cases of this type. Now, weighted spinal anesthesia is used for abdominal delivery.

As the number of deliveries in which this procedure was used—between 500 and 600—is small compared to the many large series reported in the literature, it would seem to add little to make a statistical analysis of the series. The author has found that success with the procedure has increased as skill in its administration has improved. The majority of failures can be attributed to failure in the proper placement of the needle in the caudal canal. There was a small number of patients in whom the anesthetic agent seemed to have no effect and a few in whom a satisfactory anesthetic level was not obtainable, but in general it can be said that failure to establish adequate analgesia generally resulted from failure in the administration, not in the procedure itself.

With the technique previously outlined employed, it is usually found that within 30 to 45 minutes the anesthetic level is established at about T-9 or T-10. Sometimes the frequency and duration of the uterine contractions diminishes noticeably, indicating that some of the motor fibers have been involved in the anesthesia. The author has found that the use of small doses (2 minims) of obstetrical Pituitrin® or Pitocin® are effective in counteracting this effect, and there have been no untoward reactions from the use of such uterine stimulation.

The duration of effective analgesia averaged three hours, with an occasional shorter period and a few cases in which anesthesia lasted four hours or more. Usually by the end of this time, if not before, dilation is complete and the presenting part is low, if not actually on the perineum. A reblock is then done if necessary and the baby is delivered.

There have been but four instances of puncture of the subarachnoid space, three of which were immediately noted as the spinal fluid flowed from the end of the needle on removal of the stylet. In those cases no further attempt was made to use caudal anesthesia. In the fourth patient, in spite of the rou-

tine procedures to avoid subdural injection (aspiration of the needle, ten-minute wait after the administration of the test dose, and further attempts at aspiration before injection of the full dose, questions to elicit symptoms of spinal anesthesia from the patient) there developed a rapidly ascending spinal anesthesia with respiratory arrest following the injection of the full effective dose. Artificial respiration for three hours was necessary. Fetal death occurred in this case, but it was the only one in the series which could be attributed to the anesthetic procedure. This case was the only one in the series in which there was serious complication. Rapid drainage of the spinal fluid might have speeded the recovery of the patient.

Forceps delivery was carried out in practically all cases. This is in agreement with reports by other investigators. In a very high percentage of cases the baby breathes or cries before delivery. Because of this prompt initiation of respiration, it is essential to take care to wipe out the mouth or aspirate the mucus from the mouth as soon as the head is delivered, and before the remainder of the delivery is carried out, to prevent aspiration of fluid into the lungs.

Occiput rotation is more frequently required with caudal than with inhalation anesthesia, but the ease with which this is done when the soft parts are completely relaxed more than compensates for the higher incidence.

While no accurate studies have been made in this regard, it is the author's clinical impression that the loss of blood at delivery is not appreciably reduced with the use of caudal analgesia. This is contrary to the reports in the literature.

In the present series there were no cases of infection resulting from the use of caudal analgesia and there were no instances of postanesthesia nerve involvement.

#### CONCLUSION

In conclusion it seems safe to say that caudal analgesia is a useful and valuable procedure in the practice of obstetrics when used with care and proper supervision in carefully selected patients. The author is satisfied that the requirements for the administration of caudal analgesia can be met in any good, well-run small hospital.

The advantages offered by caudal analgesia are several:

1. It is possible to carry the patient through the latter part of the first stage and second stage without heavy sedation and its potential undesirable effects on the infant. Most patients tolerate labor better when they feel assured that the latter stages will be painless.

2. The prompt vigorous cry of the infant is in pronounced contrast to the more delayed, less active cry of the infant whose mother has been heavily sedated during labor and is under general anesthesia for delivery. Where it is not always easy to have the services of a trained anesthetist, avoidance of general anesthesia is a distinct advantage.

3. Patients under caudal anesthesia are much easier to care for in labor; there is less tension on the part of the nursing staff, and fewer hurry calls for the physician, which in a small hospital without a resident staff is a distinct advantage.

The disadvantages of caudal anesthesia are few but definite:

1. It is a comparatively difficult technical procedure and requires practice to administer successfully.

2. It is potentially dangerous because of the injection of large amounts of anesthetic agents which, if through error they enter the subarachnoid space, may lead to death.

3. It necessitates operative deliveries in most cases, so that it ought not be used by physicians who are not qualified to perform them.

4. It is time-consuming for the attending physician.

Low spinal anesthesia has several advantages not possessed by caudal anesthesia. It is simpler and, because only small amounts of anesthetic agent are employed, it is not potentially as dangerous. Its use for analgesia in the first stage is limited. The problem of postanesthesia headache has been an annoying one in the author's limited experience with spinal anesthetic. This relatively minor complication has caused so much discomfort to such a large proportion of cases that the author prefers not to use this technique if caudal anesthesia is at all feasible.

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